ABSTRACT OF THE DISCLOSURE

In a method of forming an oxide layer using an atomic layer deposition and a method of forming a capacitor of a semiconductor device using the same, a precursor including an amino functional group is introduced onto a substrate to chemisorb a portion of the precursor on the substrate. Then, the non-chemisorbed precursor is removed. Thereafter, an oxidant is introduced onto the substrate to chemically react the chemisorbed precursor with the oxidant to form an oxide layer on the substrate. A deposition rate is fast and an oxide layer having a good deposition characteristic may be obtained. Also, a thin oxide film having a good step coverage and a decreased pattern loading rate can be formed.